

Example 1:

Aerosil® 200 is mixed with 4 parts water and 18 parts 3-methacryloxypropyl-trimethoxysilane (for example DYNASILAN MEMO) and the mixture is heat-treated at
5 140 °C under an inert gas.

The silica obtained has the following properties:

BET [m ² /g]	138
Tamped density [g/l]	52
pH	4.6
C content	5.7
Loss on drying [%]	0.8
Loss on ignition [%]	9.7
DBP number [%]	228

Example 2:

Aerosil® 200 is mixed with 3 parts water and 16 parts 3-glycidioxypropyl-trimethoxysilane (for example DYNASILAN GLYMO) and the mixture is heat-treated at
10 140 °C under an inert gas.

The silica obtained has the following properties:

BET [m ² /g]	165
Tamped density [g/l]	53
pH	4.9
C content	5.5
Loss on drying [%]	1.5
Loss on ignition [%]	8.7
DBP number [%]	242

Experiment 1:

A conventional 2-component polyurethane coating has been used to investigate the improvement in the scratch resistance. The recipe for the coating and the preparation, including the application, are summarized in the following:

Recipe:

		Parts by wt.
Millbase	Setalux C 1152, XX – 51.50 % (Akzo Nobel)	53.3
	Butyl acetate 98 %	6.7
	Xylene	6.7
	AEROSIL (silica according to example 1)	5.0
Σ		71.7
Lacquer constituents:	Setalux C 1152, XX – 51.50 % (Akzo Nobel)	1.1
	Xylene	12.2
	Ethoxypropyl acetate	1.5
	Butylglycol acetate	1.5
Hardener:	Desmodur N 75 (Bayer)	17.0
Σ		105.0

Binder concentration:	40 %
AEROSIL® calculated with respect to the millbase (SC):	18.8 %
AEROSIL® calculated with respect to the coating (total):	5 %

AEROSIL® calculated with respect
to the coating (SC):

12,5 %

Preparation and application of the coatings

The Setalux is mixed with the solvents. For predispersion, the AEROSIL® is then
5 incorporated into this mixture with a dissolver (disc Ø 45 mm) and predispersed for 5 min
at 2000 rpm. The mixture is dispersed in a laboratory bead mill for 30 min at 2500 rpm
and a pump output of 60 % using glass beads (Ø approx. 1 mm). The dispersing quality is
checked with a grindometer, 25 µm, in accordance with DIN ISO 1524. It must be smaller
than 10 µm.

10 The lacquer constituents are added to the millbase in accordance with the recipe, the
components being mixed with a blade stirrer at 2000 rpm. The hardener is stirred into the
mixture in the same manner.

After the coatings have been adjusted to the spray viscosity according to DIN 53411, the
coatings are applied to black-lacquered metal sheets, for example DT 36 (Q-Panel), by
15 means of spraying application (layer thickness about 40-50 µm). After the spraying, the
metal sheets are dried for 24 h at room temperature and then for 2 h in a drying oven at 70
°C.

Scratching experiments:

The metal sheets are scoured with a quartz/water slurry (100 g water + 1 g Marlon A 350,
20 0.25 % + 5 g Millicarb BG) with the aid of a scouring and washing resistance testing
machine (Erichsen, brush with pig bristles). The shine before and 10 min after scouring is
determined with a reflectometer (20 ° incident angle).